1608/952

REPORT
ON THE
HARBOUR
OF
SCARBOROUGH;
AND
ON THE MEANS NECESSARY
FOR
ITS IMPROVEMENT.

BY
WILLIAM CHAPMAN, ENGINEER.

Scarborough:
PRINTED BY G. BROADRICK.
M, DCCC.

BRITISH MUSEUM
15 MAR 69

THE

CONTENTS.

Section.		Page.
I.	*The progressive state and effect of the Works, constructed for the formation and improvement of the Harbour of Scarborough.*	5th.
II.	*The Works requisite for the further improvement of the Harbour.*	11th.
III.	*The Charges at which the Works have been executed, and the method of carrying them on, subsequent to the Year* 1732; *when the first Act was procured for the New Pier.*	15th.
IV.	*The methods proposed for continuing the works, and an estimate of the expence of their completion.*	21st.
V.	*The Advantages which vessels using the Northern Trade have derived from the Harbour of Scarborough; and the greater use which may be made of it in its more improved State.*	27th.

BRITISH MUSEUM
15 MAR 69

THE
PROGRESSIVE STATE AND EFFECT
OF
THE WORKS
Constructed for the Formation and Improvement
OF
SCARBOROUGH HARBOUR.

SECTION I.

Gentlemen,

Having, according to the instructions of your special Committee, not only looked into the state of the Harbour of Scarborough, and the works carrying on for its improvement; but also examined the numerous papers, reports and accounts, in the possession of the clerk and other officers acting under the Commissioners, I am enabled to give you my sentiments on the propriety of what has been done, and on what are the measures which I conceive, would be most conclusive to the end proposed by the Legislature, of obtaining a great *depth of Water* in the Harbour, so as to render it a place of refuge in storms, to vessels frequenting this coast.

Few things are more uncertain in their result, than the effect of works constructed for the improvement of Harbours, or more expensive in their formation, than those attempts often are; I therefore, shall begin by relating the progression of the works carried on for the improvement of the Harbour of Scarborough, and the alterations in this Harbour which have attended or accompanied them respectively; and also the various and often discordant opinions as to their relative causes and effects, both before and after each particular work was constructed, that you may be able to judge of the probability of my subsequent deductions being well founded.

Henry III. in the 36th. Year of his Reign, on the 30th of July 1252, granted " particular duties for the benefit of the Town of *Scardebourgh*, to make a certain *new Port* with timber and stone towards the sea, whereby all ships arriving there, may enter and sail without danger, as well at the beginning of a flood as at high water, "

In the year 1545, in the 37th. year of the reign of Henry VIII. an act was passed, imposing a duty for repairing the Pier at Scarborough, the preamble of which states, that, " Of *old Antiquity* this port or haven had afforded refuge and safe harbour at all times and at every full sea to ships, boats, and vessels, *in any adversity, tempest, or peril on the North Coast*".

In the 8th. year of the reign of Queen Elizabeth (in 1564 or 1565), the Pier being ruinous and decayed, the Queen granted £500 in money, 100 tons of timber, and 6 tons of Iron, in aid of rebuilding it, on condition of its being 20 feet in height in place of 16 feet, which it then was, and also that its other proportions should be increased.

I have abstracted the preceding information from Mr. Hinderwell's History of Scarborough, to shew that for many centuries, this Harbour has been found a place of refuge for ships using the *Northern Trade.* — The Pier at that time, *according to the condition of Queen Elizabeth's grant*, could not have extended farther than low water spring tides; and probably not so low, because the rise of spring tides is equal to the then height of the Pier.— Soon afterwards, in the year 1605, we find (*vide* Hinderwell's History of Scarborough) the Pier gone out of repair, and that the merchants and Ship-owners were so sensible of its consequence to the northern trade, that those of the several ports from Sandwich to Tynemouth Haven, petitioned that a duty might be imposed upon all coals shipped from the port of Newcastle upon Tyne and its Members, for the building and maintenance of Scarborough Pier.

This Pier extended from A. to B. in the plan, viz. from the shore to the Locker-House; and, whether originally or at some subsequent period, it was farther extended by a change of direction from the Locker-House to the west end of the Inner Island Pier, viz. to C, the interval between which and the Locker-House having been taken away on a future enlargement of the Harbour. — That they were originally joined is apparent;

both

15 MAR 69

both from similarity of construction, and also the direction of a part yet projecting from the Locker-House; which is further confirm'd, by several vessels having received damage when laying across this line of direction; and the remains of an old foundation having been found under their bottoms.—This old Pier and some other works of a later date, are formed of large stones * rounded by being rolled by the waves on the shore and against each other; and have an appearance similar to an oblong pile of cannon balls not completed to the top. —— Its interior was filled with smaller stones and gravel; and (although experiencing frequent damages) withstood the force of the sea tolerably well, both from its construction, and its being sheltered by the loose rocks, which, before the building of the outer Pier, laid on the surface of the Scar called the Naval Rock.

The Harbour comprised within this Pier is, at this day, very small and shallow; but at that period has been more deep and extensive, as "*Quay Street* has evidently form'd a part of the old Harbour; mooring posts having been discovered in the cellars of some of the houses" † *on the north side of that street.*

The Harbour thus formed, being shelter'd from all winds, would naturally, unless when waves broke over the Pier, be very still, and thus, in course of time would become shallow; and therefore at some subsequent time, which I cannot precisely learn, an enlargement of the Harbour took place, by extending the *New inner* Pier from the Locker-House to nearly the end of the present *outer* Island Pier, which must have been considerably subsequent to the Year 1614, when (in consequence of the petitions from the different ports in 1605) powers were granted to build the first stone Pier, and prior to 1732 when the first act for the New Pier was granted; therefore probably about the close of the last century.

I conceive that it also must have been at the same period, that the former part of the present new Pier F. g. has been built., because of its being similarly constructed of rounded stones, and that it must have been found necessary to break off the North-eastern Waves, which, after passing round the Castle foot, would break over the extended and less shelter'd part of the then outer Pier.

---

* The Interstices between these Stones are closely filled by smaller ones driven into them.

† Hinderwell's History of Scarbrough.

Whilst the Harbour extended no farther than the first enlargement by the Pier b d; and had an opening between the *inner* Island Pier and the Locker-House, there was sufficient depth of water for small or light vessels, where the Ship-builders' yards now are : as appears from a printed circular letter to the Commissioners, from the late Mr. Mc. George, dated July 17th. 1787, wherein he says, " that many persons of credit remember fishing in 5 or 6 feet water (at high water) behind the spot whereon ships are now built high and dry on the Sand. "

The outer part of the Harbour must also at this time have been much deeper, as I find by a letter, from the late engineer Mr. Vincent, to the Commissioners, dated, Sunderland, August 16th. 1752, " that the foundation of his extension (viz. the part of the New inner Pier extending from b to E, curving outwards towards the sea) was laid in 12 *to* 13 *feet depth of water in low water* spring tides; but that the sands have grown up on the inside to near the Pier Head. "

On the second extension now spoken of, which goes by the name of Vincent's Pier, the outer end of the Pier, which formed the first enlargement, was insulated by making a passage sufficient for a ship; which was, when not in use, closed by a Draw-Bridge. —— The Harbour, however, becoming less agitated, began to shoalden ; and probably from the form of the stones used, it was then found expedient to make an opening (now called the Dooker Hole) through the inner Pier, which afterwards was occasionally closed by booms let down between two upright balks fixed to each side. ——— This opening is 21 feet wide between the balks, is generally kept open in summer, and closed in winter: when open, it has a visible effect in cleansing the Harbour.—It was also used as a passage out of the Harbour for small vessels, before the extension of the New Pier.

The first account I find of the Dooker or Ducker Hole is, an order of the Commissioners on September 25th. 1761, to throw a parcel of Stones before the Dooker Hole, to prevent the great weight of water coming through the same.—I therefore conclude, that at this time it was not sufficiently shelter'd by the New Pier, to admit of the Waves being resisted by booms.

The first act obtained for the building of the New Pier was, as before noticed, in the year 1732.

The existing old work of the Castle foot, distinguished by being composed of round stones, extends about 70 feet on the inside, * and at the period in which an old plan was drawn by Mr. Vincent, comprising the whole of his plan, (consequently prior to 1752, at which time he was at Sunderland, and had recently quitted Scarborough,) the extent of the Pier from the Castle foot, was said to be *old work* 73 feet, *new work* beyond it 103 feet, *new* foundation laid 43 feet, which are shewn in the Plan by the figures 1. 2. 3.

This Pier was, no doubt, from the beginning, of great service in turning and breaking off the waves from the North-eastward: but a farther extension was requisite to protect the inner Pier effectually, as in a hard Gale of Wind, in the Year 1763, a great breach took place near the Locker-House, and the waves passing through it washed many ships out of the Harbour, driving them upon the rocks South of the Spaw.

In the Year 1781, when the new Pier had extended to about † 500 feet (viz. to the figure 5;) I find by a letter from the late Mr. John Garnett, to the Commissioners, that the Harbour had grown shallower by filling up with sand, which he attributed partly to the New Pier, and partly to the rocks having been taken away from Ramsdale Scar, which he alledged, had formerly impeded the current (which sets into the Harbour from the Southward along the Coast, from about half flood to near low Water) from carrying sand into the Harbour.——The latter opinion, it appears, originated with the late Mr. Vincent, (prior to 1752) of which Mr. Mc. George in his letter to the Commissioners, in July 17th. 1787, says, " But, unhappily it was determined to take up a good " part of the Ramsdale Scar rock, to accommodate ships better in sailing " out of the Harbour. Mr. Vincent then predicted the exact consequence " of the Harbour filling with Sand, and which has happened; and from the " alarming continuance of an evil, that in time must render every species " of Pier useless, it is submitted, *whether it would not be expedient to lay a* " *sufficient mass of stones in Ramsdale Scar*, to restore it to a situation " similar to that in which it was found so beneficial, and seemed placed by

---

* Only about half as far on the outward face, because of a breach which has been repaired with other Stones.

† By a Paper of the late Mr. Mc. George's, the New Pier on the 24th. July 1787, extended from the Shore 736 feet; and the usual length built annually for a few years prior, was reported to be 40 feet.

"the hand of Providence for the protection of the Harbour." These, and other similar representations, induced the Commissioners to commence, and continue laying a ridge of stones upon Ramsdale Scar, from within 50 yards of the foot of the cliff.

The first order for laying these stones was on the 30th. of August, 1784, and, in consequence of different representations, was continued unto the 25th. of August 1795; but on the date of the 26th. July 1796, I find the following minute in the Order Book; viz. "It appears from evidence given to the Commissioners, *that the Stones laid on Ramsdale Scar are of no Utility;* they are therefore ordered to be applied to the New Pier."

THE

THE WORKS

Requisite for the further Improvement of the Harbour.

SECTION II.

From the preceding narration, it appears that *shallowness of Harbour always followed the completion of works*, which occasioned the *necessity* of their *farther extension ;* which was again succeeded by the sand following these additional works. — Those circumstances are no doubt alarming, but they are not irremediable.

Whilst no Works were erected, the effect of the waves and the current kept the beach deep, where the Ship-Yards and Quay-Street stand at present; and as there was no back Water to scour out the Harbour, the natural effect of the too great tranquillity produced by the successive Works, has been what we have seen ; the only remedy, therefore, seems to be, to admit such a degree of agitation in the Harbour, as shall not injure the safe lying of Vessels ; but shall at the same time raise the sand, and keep it mixed with Water, so as to allow of its being carried off in the manner it was formerly done, by the setting outwards of the current which sweeps into the bay from the South-westward, from half flood to nearly low Water.

The Dooker Hole, already mentioned, has proved the eligibility of this system ; and what I have to recommend for its farther perfection, will appear when I come to speak of the completion of the New Pier.

Mr. Smeaton, when he planned this Pier, suggested two lines of direction ; about which there has been much controversy, each having its advocates ; one of which called the inner line, was proposed to have curved round from opposite the Locker-House, so as to join Vincent's Pier Head, the partisans for which, rested their opinion chiefly on the greater ease of its execution, because in shallow water and more receding from the action of the Waves; and that the Water * would be no deeper round the Pier Head in the outer line, than it now is round Vincent's Pier, and that the passage between the two heads would be too narrow for any vessel to enter in a storm. —— The advocates for the outer line, which is nearly the one now pursuing, assert, and prove by borings through the Sand, that the difference of expence of building would not be very essential; that the head of the outer Pier would be more free from the eddies from the Castle hill, in Winds from North to North-east, and enable vessels to fetch within the Pier Head, when they would otherwise be blown to leeward; that vessels going to sea with winds from South-west to South-east, would have room to turn to windward, from the increased width of channel, (between the shore and the Pier Head) and would not be so liable to be thrown against the back of the Pier, which, in the inner line would be more difficult to clear, with South-east winds; and that there would be more water by eight feet at least, which circumstance would enable ships to come in on the approach of a stormy night, without waiting for high water.

The advantages appear to me to preponderate in favor of the outer line; and I shall now proceed to describe what I conceive remains to be done for the benefit of the Harbour, the present state of which is shewn by the annexed plan, drawn from a survey made for this purpose by Mr. Chambers.

The New Pier is now advanced to the extent of 310 † yards from the shore, and it appears to me to be adviseable to extend it from G. to H, so as to shelter the present extent of Harbour, from all winds which have not hold of Flambrough-Head, which will require a farther extension of about 150 yards.

The

---

* Vide the Ship-owners' opinion given on the 30th. of August 1787, on various questions proposed to them by the Commissioners.

† Viz. 307 yards completed, to which 10 feet, but say 3 yards, may be added, as an average of the work advanced below.

The principal cause of the depth of the present Harbour, and of the space included between it and the New Pier, is, that the waves in South-east Winds, which are caught and reflected by the part of Vincent's Pier, which curves outwards, rush up with violence towards the head of the inlet between the two Piers, and consequently pass with force through the Dooker Hole, when open; the effect of which is visible for some distance, and also along the inside of the Pier.

In the New Pier, a small aperture has been left through it, of about three feet square, where shewn by the dotted lines, and at a little above the level of neap tide low Water.

The effect of this hole, small as it is, is very apparent along the inside of that Pier: therefore, as the inner end of the Pier is ill built where consisting of the original materials, I recommend that part to be taken down in the beginning of some summer, and rebuilt, after having previously laid upon the Scar without it, a sufficient number of large stones, to answer the necessary purpose: — The stones to be pulled down, being then laid behind them, will form a sufficient barrier against any summer storm.

On the rebuilding, I recommend five or six apertures to be laid as low as possible, each to be of the height of two middle courses of stones, and as wide as can conveniently be floored, and covered, with such large stones as can be had.

These dimensions I conceive will be nearly five feet square.—In high gales from the North-east, the water would rush through with too much impetuosity; but each hole being of small dimensions, may either be stopt partially, or wholly, by the following means: viz. by a vertical opening above each, near the middle of the Pier, of sufficient dimensions, to let down end-ways so many balks as may occupy the full width of the opening; the ends of them falling into a groove of eight or ten inches depth: thus without any fear of the booms breaking, the whole, or any part of each opening, may be stopped, or kept open, as circumstances may require: Besides these openings, I recommend other individual ones to be made at about every thirty yards throughout the remainder of the New Pier.

When the New Pier shall be advanced so far as to prevent any ill effect from the waves striking the outside of Vincent's Pier, I think it will be eligible to take away all the inner Pier within the Dooker Hole, substituting two or three small Dolphins in its stead; which will admit vessels to pass into the outer Harbour; and the sea, from the proposed five or six openings, to scour the inner one.

As it is expedient to leave a passage to Vincent's Pier for those who go to assist in heaving ships into safety, it will be necessary to lay a foot-bridge over the Dolphin heads, and to have a Draw-Bridge over the lowest opening, which should be thirty feet at least, so as to admit vessels to pass with ease.

Whenever the New Pier is completed to its full extent; then, I conceive, it will be proper to make an opening above the Locker House, of thirty-five or forty feet wide, to admit large vessels to pass easily from the inner to the outer Harbour, from whence they will generally take sail: this opening should equally with the other, have a foot draw-bridge.

It may probably be requisite to take more of this Pier away, or to make an opening below the Locker House; but this, as well as the taking down of the outer end of Vincent's Pier, will depend on future experience of their eligibility, and on circumstances which I shall mention before the close of this report.

◆

THE

THE CHARGES

At which the Works have been executed, and the Method of carrying them on, subsequent to the Year 1732, *when the first Act was procured for the New Pier.*

SECTION III.

As the sums expended to this period, with the present charges of finishing any given portion of the Pier, and other works, will afford some *data* for the probable expence of the future, it becomes of course necessary to investigate them. — The most essential for the present purpose will be that which is latest done; because most similar to what remains to be executed from being in nearly the same depth of water.

According to the information procured from Mr. Speight, the surveyor of the works. the length of Pier built in the last five years is 140 feet, exclusive of a length of 28 feet which rises by steps above water; the whole may therefore be taken at 150 feet, or ten yards annually.

The base of the Pier was founded upon the Naval Rock (dry at low water spring tides,) until within 220 feet of the present extent of the inside face of the Pier, and 270 feet on the outside, the Rock crossing it obliquely, and falling abruptly to ten feet depth at low water, which at a little distance increases to twelve feet. —— The whole of the work of which the price is now investigating, being only fifty yards, it is consequently considerably without the Rock, beyond which, the regular work of the Pier is founded on a base of stones cast promiscuously.

The

The regular base of this Pier is nearly fifty feet in width at the low-water line, at which the depth is twelve feet, and the stones are supposed to sink four feet lower, where there is a stratum of clay, as the foundation is always so far extended as to be exposed to the waves two years before built upon: — under these premises, with the admission of the average base of slope on each side to be two to one, in height, and with a further large allowance for backing the outside of the Pier, I estimate each yard in length of the foundation and backing of the Pier, to require 160 cubic yards: consequently the fifty yards built in these five years, would require 8000 cubic yards; which, as they are thrown down promiscuously, cannot exceed 24 Cwt. each cubic yard, or 9600 tons in all.

The superstructure in this part is equal to fifty feet base, thirty feet top width, and thirty feet height, equal to 134 cubic yards per yard in length; which, as the stones are laid as close as the irregular form and roughness of the blocks, which are mostly from two to six tons weight, will admit of, and are well filled in the vacances, may be estimated, when thus placed, to weigh 32 Cwt. per cubic yard: consequently the superstructure of 50 yards in length, built in the same period, would contain 6700 cubic yards, and weigh 10, 720 tons, which with the 9600 tons for foundation &c. gives a consumption of 20, 320 tons of stone.

In the same period, according to the subjoined account, * (with a small addition for the stones got in September and October 1795,) 1140 Float-loads of stone have been brought from the shore, without the white Nabb, which is above two miles South of Scarborough, and where the stone

---

* **Float loads of Stone in the last five Years.**

Years	April	May	June	July	Augt.	Sept.	Oct.	Total.
1796	22	21	66	69	26	9	6	219
1797	30	66	51	55	66	19	—	287
1798	32	53	63	54	54	20	—	276
1799	—	23	21	54	48	36	—	182
1800	10	42	39	45	21	—	—	157
								1121

I have given the above abstract to shew that the portion of the Year is very limited, in which they are able to convey to the Pier any material quantity of Stones.

stone is in regular beds, of two to four feet in thickness; with many fissures perpendicular to their beds, which enables them to be wedged asunder, and where too far distant for that purpose, which rarely happens, they are separated by gunpowder.

The stones are then, when about one or two tons weight, slung with chains; and when large, the chains are affixed to the stones by lewisses; the whole being then buoyed, the Floats come near them, and hoist upon deck such stones as do not exceed four tons each, those which are larger, they heave up by a windlass, one to each end, where they are suspended just below the surface of the water.

The loads of these boats depend much on the weather; and they were stated to me to be 25 to 30 tons, with stones upon their decks; and from 20 to 40 tons with large stones suspended in the water.—The result, however, of the last five years work is 20, 320 tons divided by 1140 Float loads, rather less than 18 tons for the average load, although I have made a high estimate of the quantity consumed in a given length of the work.

Including four holers, and four artificers, who attend with the crews, there are forty four men employed in the three Floats, whenever they make a tide; and these are the whole of the men employed about the pier.

They sometimes make two tides in the 24 hours; but not often: they are paid for each tide, the same wages as for a day, which amounts for the three Floats to 4l. 10s. 2d.—It requires, according to the account of Mr. Speight, the surveyor of the works, eight men for wedging the stones, making the lewis holes, fixing the chains, &c. four days to prepare the three Float-loads; whose wages in that time amount to 1l. 14s. 8d. thus the cost of three Float loads laid down, or cast over board, at the Pier, amounts to 6l. 4s. 10d.; equal, if the Floats carry 18 tons each, to two shillings and four pence per ton (in place of nine pence, as calculatd in some papers presented to the Commissioners): to this, has further to be added the Tradesmen's bills for iron, cordage, &c. used about the Floats, and for raising the stones; the average of which, for the last five years, has amounted to 273l. which upon 228 Float loads, the annual average quantity, amounts to a further charge of one shilling and four pence, which makes in the whole three shillings and eight pence per ton, for the cost of the stones cast over board at the Pier; equal to four shillings and five-pence per cubic yard, for the mass of the foundation, and to five shillings and ten pence for what has afterwards to be placed in the Pier.

In this part of the work there appears no room for retrenchment of expence, under the assumption of the Floats carrying 18 tons on the average.

As to the remaining part of the work, the placing the stones regularly in the superstructure above low water, I conceive something may be done; and therefore I have thus analysed the expences.

The average annual sum paid for wages in the last five years is 1030l. from which deducting 228 Float loads of 18 tons each, at 2l. 4s. for wages, and 200l. as the annual average repairs, which are generally carried on in winter, we have remaining 351l. which upon 1340 cubic yards, built annually, amounts to five shillings and three pence per cubic yard, for hoisting up the stones, and placing them in the Pier; viz. in all eleven shillings and one penny per cubic yard, for the superstructure.

In fine, the whole annual expenditure obtained from that of the last five years and four months (the accounts not being settled to the same period every year,) consists in labourers wages 1030l. tradesmen's bills 273l. officers' salaries 132l. total 1435l. * which, at ten yards length, built annually, amounts to 143l. 10s. per running yard.

The validity of this estimate necessarily depends on the accuracy of the extent of Pier executed in the last five years, of which it does not appear they have any certain memorandum.

From Mr. Mc. George's letter before quoted, I find that on the 24th. of July 1787, the New Pier was extended from the shore, 736 feet; viz. 245 yards and one foot. — In September 1795, it was accordingly, to what has already been mentioned, 260 yards; the difference therefore is only 14 yards 2 feet for *the extent of work finished* in eight years and nearly two months, or rather *in five years*, as upwards of three years, according to my information, was occupied in laying the stones on Ramsdale-Scar; and in the new work about the Island Pier.

---

* The average annual Income for the same period was 1536l. viz. for the last five years.

The length of the period, and the short extent of work, shew that there is some error in the length given in, as executed in the last five years, and that the progress has been slower.

The whole expenditure from September 2nd. 1790, * to the present time, is, according to the abstract of accounts which I have before me, 14, 400l.; in which period (according to the distances given by Mr. Mc. George, in 1787; and those, at the present time, by Mr. Chambers the architect) only 64 yards two feet; say 65 yards, have been built, and at the rate of 221l. 10s. the running yard.

According to the *last* of these statements, only six yards and a half of Pier have been built annually during ten years, and at the rate of 210l. per running yard; and according to the *former*, there has in the last five years been built annually ten yards of Pier at the rate of 143l. 10s. — It is however generally admitted that Mr. Speight, during the latter period, in which he has had the superintendance of the work, has carried it forward with more expedition than it had formerly been: therefore the present expence of conducting the Pier *lies between* the two sums stated; of which I am convinced from the number of Float-loads, and what I have seen of their burthens on the 15th. September, which did not exceed ten tons each, although the weather was as favourable as it might be expected to average throughout the season. — Their dimensions are not such † as to warrant their carrying the burthens stated to me, but I think them, exclusive of all their apparatus of windlasses, crane, chains, cordage &c. equal to an average load, in fair and indifferent weather together, of 18 tons each; therefore the estimated price of stones thrown over at the Pier, is such as the work may be done for, under more coercive management of the people employed.

Having thus examined one period in which the measures have been ascertained, I shall go back to the commencement of the new works in 1732.

---

* The time intervening between this date and that of July 1787, being allowed for as aforementioned.

† They are very strongly built and the largest is of the following dimensions, viz. 45 feet 6 inches length upon deck, 21 feet extreme breadth, 13 feet length of floor, and 4 feet depth of hold. — One of the other is nearly as large, and the one remaining is some tons less.

The nett amount of the Pier duties from Midsummer 1732, to the 19th. of August 1800, is 65, 420l. of which, was expended in obtaining acts of Parliament, taking witnesses to Town, &c. nearly 2000l. and since July 1787, 18, 850l. which, with the cost of 1334l. in the three per cents, and 388l. in the Treasurer's hands, amount to nearly 22, 000l. and leave 43, 420l. for the expenditure of the *fifty-five years succeeding Midsummer* 1732,

The curved part of Vincent's Pier was formed *during this period;* and as the greater part of the space between the outer Island Pier (where Vincent's Pier properly commenced) and the Locker House was rebuilt, we may estimate the new work of this Pier to commence at one third of the distance from the outer Island Pier towards the Locker-House, which will make it equal to 130 yards in length; to which we have to add 245 yards of the New Pier finished in Midsummer 1787, deducting from it 20 yards, as the average inside and outside length of the old Pier, from the Castle foot; and there will then be 355 yards length of Pier executed for 43, 420l. equal to 122l. per running yard; which, as only about one third of it (viz. the curved part of Vincent's Pier and about 17 yards of the new Pier) was in deep water, and the wages lower, may be deemed to bear tolerably near an average with the subsequent works in the last ten years.

THE METHODS

Proposed for continuing the Works, and an estimate of the expence of their execution.

SECTION IV.

The strata of stone now left, without the white Nabb, do not afford nearly the proportion of regular blocks as those which were taken away formerly; so that no more can be expected than will form a casing of 10 to 12 feet in width on each side the Pier: therefore, in place of being thrown into the water promiscuously, as I saw them, for foundation stones, I recommend their being reserved in the manner I shall hereafter mention; which the present surveyor of the works was not unconscious of, and would I believe have carried into effect; but, from his age, his want of hearing, and his salary scarcely being more than that of a common artificer, he has not the power of enforcing respect and obedience to his proper commands; and to this result is also to be attributed the insufficient loading of the Floats.

Whoever has the executive authority, should have activity and energy, and be vested with the means of mulcting the pay, or speedily displacing any subordinate officer, or workman, who does not, on every necessary occasion, exert himself on the business in which he is employed.

The present Surveyor is worthy of attention; and would be a useful coadjutor to a more active man; whom he also might assist by the experience he has acquired.

The direction of the Pier, as I have shewn it, points a little farther out than the part immediately preceding; so as to admit of a vessel having length (which may be requisite from various causes) to swing clear of the end of Vincent's Pier, with a head-fast to the New Pier.

To mark out this line so as to guide the Floats, with due correctness, in casting over the foundation, I recommend two lines of leading marks to be fixed on the Pier: the outside Staging Poles, sustaining the machinery, may do for the lower leading marks, and the upper ones may be two poles at a sufficient distance from the former, one set up in its proper place, on each side of the Pier, and painted white.

Then, all such stones as are unfit for facing, and covering of the Pier, for which last the heaviest courses should be reserved, may be thrown in a proper direction, taking care to throw small stones along with the great, so that their interstices may be filled up, and the waves have less hold of them.

Attention must be paid, finally,* both to the breadth, and level, to which these stones are brought. ——— On the outside, they may finish at Spring tide low water, about 10 feet in width without the foundation line of the superstructure, so as to allow of the wall being backed with loose stones; and on the inside, about three feet beyond the foundation line; and as many feet below the usual Spring tide low water mark; declining on both sides inwards, under the base of the Pier, for upwards of one third of its width; excepting in the places where the proposed apertures are to be (one of which should be placed as near the present work as may be,) in all which, the loose stones must continue level across, at three feet under Spring tide low water. —— In Spring tides, in still weather, regular stones of seven or eight feet, or more in length, should be lowered by the Floats, and the same done along the inside range of the Pier, the loose foundation of which being laid so low, will take away the danger of vessels striking upon it at any time of tide in which they may be hauled along side the Pier to go out of the Harbour.

The foundation being now levelled, or made regular, in the manner described, the base of the superstructure may be laid whenever Spring tides admit, at the distance of 42 feet asunder, each face battering inwards two inches to the foot in height; and each course of the outward face set back with an offsett of one sixth part of the height of the course below it: thus, on the outside, the waves in rising, will be thrown clear of the joints of the courses; and in the inside, from their being no offsets, vessels will be less liable to damage from coming against the Pier, in any place where there may be no Fender piles.

---

* After having settled through the sand from having lain two years or more.

With the proposed batters and offset, the Pier will reduce in width just half of its height; viz, one third on the outside, and one sixth within.

The outside of the Pier may continue 30 feet in height, as at present, leaving a parapet of 9 feet in width; may lower two courses, equal to six feet, which will leave the remaining top width 15 feet six Inches; and the inside height of the Pier 27 feet, its foundation being three feet lower.

Such good stones as answer for the superstructure; viz. the facings, pavement, and parapet, will generally be brought intermixed with other stones; but, in place of being thrown promiscuously with them, should be laid in front of the work; and on the outside space of ten feet width, which is to serve as a foundation for the backing.

I expect a sufficiency of good stones will be found to form a wall ten or twelve feet thick on the outside, and eight or ten feet on the inner side; the interval I propose, also, to be filled up regularly as at present, but only by inferior stones.

As the face of the courses, on each side, are proposed to batter one sixth of their height; and they will be formed of rough blocks, breaking square to their *beds*, it follows that the *latter* are to lie correspondently; for which cause I mentioned, that the level of the loose stones forming the foundation should decline inwards, from each side, for about one third of the width of the Pier: —— This cannot be done so regularly as may be requisite, and the error should be corrected in the first and second course of stones, by chusing such as may be higher on one side than the other, or by making them so.

The forty-four * men employed at present, appeared to make very slow progress in raising the stones to the level of their respective positions; and in heaving them by tackles into their places.

Much

---

* Thirty six of them are employed throughout the year. — For great part of the winter, many of them will be of little service; but their daily wages it appears are lower on account of constant employment.

Much labour being expended in this way, I conceive a considerable saving will arise by substituting any other power than that of men; and, by so doing, the men may be occupied principally in setting and wedging the stones, and carefully filling the intervals; and the works be much expedited.

A Steam-machine of some kind would do the work proposed, with the most economy, if the cost of it be not too considerable: but as it may be so (particularly as the condensation &c. would have to be by Salt Water) and as the Engine would only casually be in use, a Horse-machine may be more eligible, provided the cartmen, as they do in many places, would contract to supply the horses when wanted, at so much by the hour, or other time employed.

Without entering into detail, it may be sufficient to say that a Horse-machine may be very simply constructed, so as to reduce considerably the expence, and expedite the building of the superstructure of the Pier: and, therefore, I shall proceed from the preceding premisses to estimate the charge of completing the New Pier, to the proposed extent of 150 yards.

The foundation is already carried forward for some distance, but I shall set no account of it, as the finishing the extremity of the Pier will cost somewhat more than the rest.

The foundation of loose stones will not sink its full width through the sand, but only on the sides and ends of every proposed length.

I shall however admit it to do so, to allow for contingencies. The cost of it may be assumed at the estimate in the preceding pages; viz. at four shillings and five pence (say four shillings and six pence) per cubic yard, and five shillings and ten pence for that used in the superstructure, *as laid down by the Floats*; these prices are as much less than the present, as the average Float load falls short of 18 tons, which appear to be as two to three, consequently the calculated cost of setting the stones, in place of five shillings and three pence, should have been at least seven shillings and ten pence per cubic yard: but I have no doubt that it may be done at the former estimate; or even less, as the interior of the Pier will be less heavy work than before; and the charge of raising the stones will be reduced.——If taken nearly as before, say five shillings and two pence; the cost of the superstructure will then be eleven shillings per cubic yard, on which I shall found the estimation.

I have omitted to say, in its proper place, that when vessels come to lie in the Harbour between the two Piers, it will be necessary to prevent the sea from breaking over the outer Pier; which it does, in heavy gales, in the part directly opposed to the North-east.

A parapet of six feet high, and nine feet mean width, will be amply sufficient; and at eleven shillings per cubic yard, will cost 3l. 6s. per yard running. — Each running yard of the proposed elongation of the Pier, will contain about 155 cubic yards of foundation, at four shillings and six pence per cubic yard, equal to 34l. 17s. 6d. and 108 cubic yards of superstructure at eleven shillings, equal to 59l. 8s. viz. in all 94l. 5s. 6d. say 95l.

I must here notice, that in many parts, the foundation of the New Pier has settled; and that some stones have been washed out of the outside face, which the more easily took place, as the beds of the courses *which were originally horizontal*, had assumed a slope outwards.——*Many parts also require further backing*, and *some attention* ought *shortly* to be paid to the *weak parts*. —— After the outer Pier has been extended about 100 yards, it probably may be found safe to begin taking down the inner part of Vincent's Pier, and also to take away many of the stones laid behind to back it, all of which may go to the New Pier, with less expence than from the Quarry; but the saving will, I think, not exceed, or perhaps equal, the expence of the Dolphins, the Foot-bridges, and the building up the ends of the proposed openings.

ESTIMATE.

	£
150 yards length of New Pier at 95l.	14,250
100 yards of parapet in the current part of the Pier at 3l. 6s.	330
Additional backing throughout the whole length of the Pier (viz. 310 yards) at ten cubic yards per running yard, and four shillings and six pence per cubic yard,	696
Repairs in replacing of stones &c. - - - - - - - - -	250
Pulling down and rebuilding 25 yards of the Pier from the Castle-foot, and making apertures for scouring the Harbour, at 50l. per yard,	1250
Fender-piles on the inside of the Pier, - - - - - - - - -	800
Annual repairs during the completion of the work, say 200l. per annum for fifteen years,	3000
Annual salaries of all the officers for that period, at 250l. per annum,	3750
	£ 24,326
Contingencies 10 per Cent, - - - - - - - - -	2433
	£ 26,759

The income from the Pier Duties, if the same as at present, will probably not complete the projected works in fifteen years: but either their completion may be protracted; or money borrowed on the funds, as the annual charges will afterwards become light, so as to enable half the income to be adequate to necessary expenditure.

THE ADVANTAGES

Which Vessels using the Northern Trade, have derived from the Harbour of Scarborough, and the greater use which may be made of it in its more improved state; with observations on the principal improvements which are requisite.

SECTION V.

There being no place of refuge that can be safely entered in storms, between Tinmouth Haven and the Humber, excepting Scarborough, for vessels of any moderate draught of water; it has, as already shewn, been for many centuries deemed a place of importance to the Northern Trade of this side of the Kingdom.

Besides the superior depth of water, under shelter of its Pier, beyond what is to be found in any other Tide Haven within the described limits, it enjoys the advantage of lying at least four miles within the usual track of vessels, between Whitby Rock and Flambrough Head, which so far gives additional drift to ships in Easterly gales; and enables them to keep so much longer off the shore, as generally to enter in a proper time of tide. —— The want of due regard to this circumstance, which could scarcely happen to any well informed sailor, has led *many* vessels to attempt entering this Port in Half Tide, and even lower; the result of which, obviously was, that they were much exposed to the gales of wind they fled from, and received much injury; *which latter event only* going abroad, has brought a discredit on the Harbour, and caused an opinion to be propagated, that it is of no service, comparative to the charge of forming and maintaining it.

This opinion is further accompanied by another, which is, that a great annual expenditure takes place, and that the Pier makes no visible progress.—The foundation for the latter idea arises, chiefly, from the depth of water in which the Pier is built, as may be seen from the investigation I have made of the expences and progressive advancement of the work.

That the public may see the futility of these charges, I have, by the direction of your * special Committee, entered with uncommon minuteness into the various parts of this report.

To recapitulate every instance of advantage derived from this Harbour, in storms, would be an impracticable task: I must therefore content myself with such instances as are easily attainable.

In a paper presented to the Commissioners by the late Mr. Thomas Haggit, subscribed by him, and dated 24th. August 1787, he says, – " That " the Harbour of Scarborough is one of the easiest of access in strong " gales of wind from North-east, the following fact will establish; viz. on " the 5th. or 6th. of December 1784, when upwards of 200 sail were put " on shore between Cromer and Edinburgh Firth, all the ships which " put for Scarborough, got safe in; and hence it is needless to point " out the great advantage, which might be derived from obtaining 26 feet " water within the Pier, as then, loaden ships and those of great burthen " might come in with great safety ".

To the above, I shall add the following document, obtained from the Custom House of Scarborough, which only mentions *recent* instances viz.

A

---

* THE RIGHT HONORABLE LORD MULGRAVE.
SIR GEORGE CAYLEY BART.
SIR CHRISTOPHER SYKES BART.
HUMPHREY OSBALDESTON ESQ.
RALPH CREYKE ESQ.

A LIST OF SHIPS OF A LARGE DRAUGHT OF WATER, which have been saved by means of Scarborough Piers, there being no other Harbour on the coast, which could have afforded them safety, under their particular circumstances. — Numerous other vessels, of different descriptions, have also received similar advantages.

Years.		Ships.	Master or Owner.	of what place.	The Cause for putting into Scarborough Piers, and with what loaded.
		Good Agreement	Wright	Shields	Coal Loaded. This Ship was bilged upon the Rocks, near Filey, and her only refuge was Scarborough-Piers.
1789 Oct.	4	Liberty	Buck	Whitby	Loaded with Timber. Full of water, by a hole in the bottom; was made tight on the tide leaving her, which could not have been effected in any other Harbour on the coast, without unloading; and proceeded on her voyage.
		Pitt	Hurry	Yarmouth	Loaded with Pipe-clay. Leaky, under Jury masts; repaired and proceeded.
		Welcome-Messenger	Cook	Shields	Coal loaded. Having been holed on the rocks near Osgodby Cliffs.
1792 Oct.	11	Vulcan	Reed	London	Loaded with timber. Dismasted, brought in by the pilots; repaired and proceeded.
1796 May	30	Betsy	Crozier	Shields	Coal loaded. Having struck on Tinmouth Bar, very leaky, and with difficulty kept with both pumps.
1799 June		Young-William	Middleton	Whitby	In ballast. Very leaky, in a sinking condition, having been on Whitby rocks; repaired, and proceeded on her voyage.
Nov.	30	Hercules	Andrews	London	Loaded with masts from Riga, for government. Leaky, unable to keep the sea; repaired and proceeded on her voyage.
		Mervin	Bond	Shields	Coal loaded. Leaky; repaired, and proceeded on her voyage.

N. B. If this account had been taken from an earlier period, a much more considerable list might have been produced.

As a preventive of accidents from vessels entering the port at improper times, it will be expedient to have copies of the annexed engraved plan of the Harbour, for ſale, at the different sea ports, at a cheap rate, accompanied with ſuch instructions and remarks at the foot of the plan, as may be expedient, which there can be no difficulty in having properly drawn out, from the many intelligent Ship-owners and Seamen that are resident in Scarborough.

It is almost needless to observe, that if a sharp bottomed vessel take refuge there, from an easterly gale, when she is too deeply embayed to clear the coast, all that can be expected is, to save the lives of those who may be on board her, with all her appurtenances, and the cargo, if not perishable; which are, of themselves, material objects.—But such vessels as use the nothern trade, will bear the ground; and, in gales from every quarter, the Harbour is protected from heavy seas:—In those northward of east; the Pier, when finished, will afford sufficient shelter:–In those to the southward they soon take hold of Flambrough Head, so as to leave the Harbour under its cover; and such intermediate winds as would otherwise bring a heavy sea into the bay, have the force of their waves checked and broken, by striking into Filey bay; and into the bay southward of the White Nabb, only two to three miles south of Scarborough.

In Harbours like the one in question, there is no room for vessels to bring up; they therefore must run to the ground; *consequently*, no vessels, break-water Piers, or other impediments, should remain near the mouth of the inner Harbour, where ships entering the port in gales of wind, must, of necessity, run to the shore.—Vessels in the Harbour may always pass to the higher part of it, or between the two Piers, so as to be completely out of the way of those coming in; which, in all gales from the sea, excepting those from South-eastward, can never attempt passing between the two Piers; and, in these winds, will be under the less necessity of doing so, because, if no vessel lie on the inside of Vincent's Pier near the Harbour mouth, and the outer Island Pier be removed, if found requisite, those coming to the Harbour, may always run to the ground, under perfect shelter.

The necessity of the removal of the outer Island Pier, will depend on the increase of depth in the Harbour, which, I presume, will take place, from the execution of the measures recommended; in which case, it may be requisite to move it to between the Locker House and inner Island Pier, so as to occupy a portion of the space covered by the original first stone Pier, or its prolongation.

The terminations of Piers are frequently made to curve a little either inwards or outwards; but in the present instance of the new Pier, I am inclined to prefer a straight line, with a semicircular termination, without any swelling on either side, for the following reasons.

A curvature *inwards* would contract the entrance, and would also be inconvenient to vessels, in South-west winds and moderate weather, taking sail from the Pier Head.—This purpose would be best answered by a curvature *outwards*; which would also, by a reflection of the waves, afford a little more shelter to the Harbour in strong easterly gales: but, on the other hand, the *agitation* would be so *great* near the end of the Pier, as to prevent vessels approaching so near it as they should do, to obtain shelter on striking the ground. — If the depth of water continue after the works are finished, as I presume it may, there will be at *half flood*, *in all* * *tides*, for a considerable distance within the Pier, twenty feet water; so that, on the coming on of a dark stormy night, a great majority of the vessels which seek refuge, may find it during more than half of the flood or ebb.

To enable vessels to enter the Harbour in the night, it would be advisable to keep on the Pier Head, when finished, a light, with two reflectors, one to the eastward, and the other to the south.

The present neap tide high water, in place of going to the foot of the houses, as it formerly did, runs in a line amongst the inner dolphins, nearly as marked out.—It would be eligible to know what changes take place, and what depth there is, at any period, in each particular part of the Harbour, at spring tides.–For this purpose, I have desired that one of the outer fender piles on Vincent's Pier, may be marked, *in feet downwards*, from the usual spring tide high water; by which means any person noticing, from time to time, *the water line of the tide upon the shore*, and noting

---

* Spring tides flow sixteen feet, and the depth at low water in these tides is twelve feet.

at the same time, *the level of the water at the fender pile*, will see at once the depth of the water, in spring tides, in each particular part of the Harbour, and the progressive alterations, whether for the better or worse.

The outer part of Vincent's Pier, viz. from the westermost steps, outwards, has shrunk considerably; and, when sheltered by the new Pier, it will I think be advisable to be pulled down, so as to widen the entrance between the two Piers.—Its foundation will be in the way of ships; but, whenever any of the stones, below water, shew themselves above the sand, they may easily be taken away, by the use of a diving chest, as in Ramsgate Harbour, which will give the means of fixing a lewis in any of them.

Scarcely more than twenty *large* ships can ever take shelter in a tide, without some of them being too much exposed to East South-east winds: but the entrance of this number, I suppose, will scarcely ever be experienced: and, although, some remedy might be found by building an *outer* Island Pier, opposing a curved or angular face to the sea, which would afford shelter to the part immediately opposite, and from its form would reflect the waves striking it, so as to prevent those going to the shore from acting so forcibly as they would otherwise do; yet, the inconvenience to vessels entering the Harbour, particularly in the night, would be greater than any casual advantage which might be derived from it, exclusive of the considerations which would be due to its expence.

I am,

Gentlemen,

Your Obedient Humble Servant,

Hull, Sept. 20th. 1800. WILLIAM CHAPMAN.

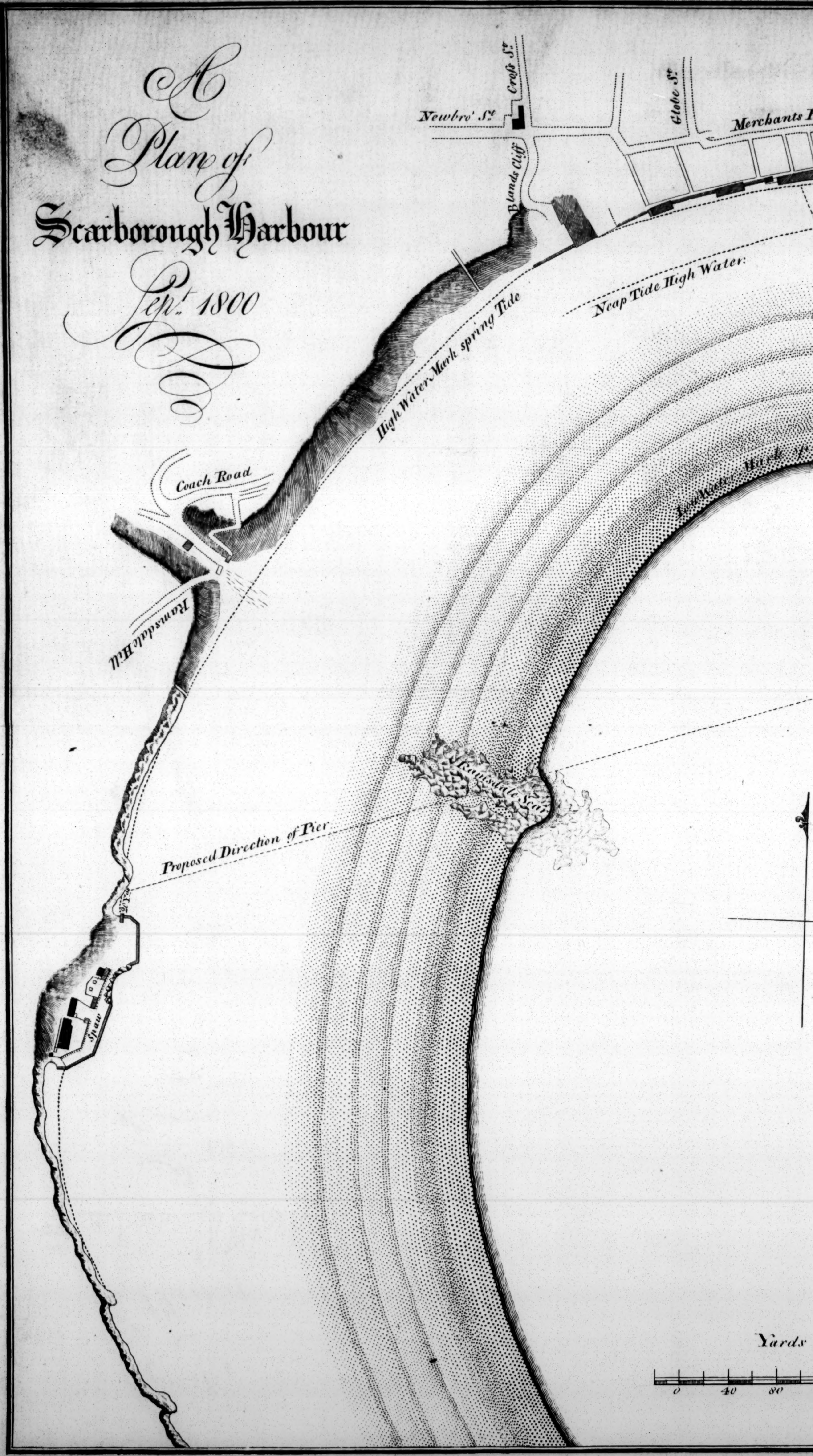
To the Commissioners
for Scarborough Pier.

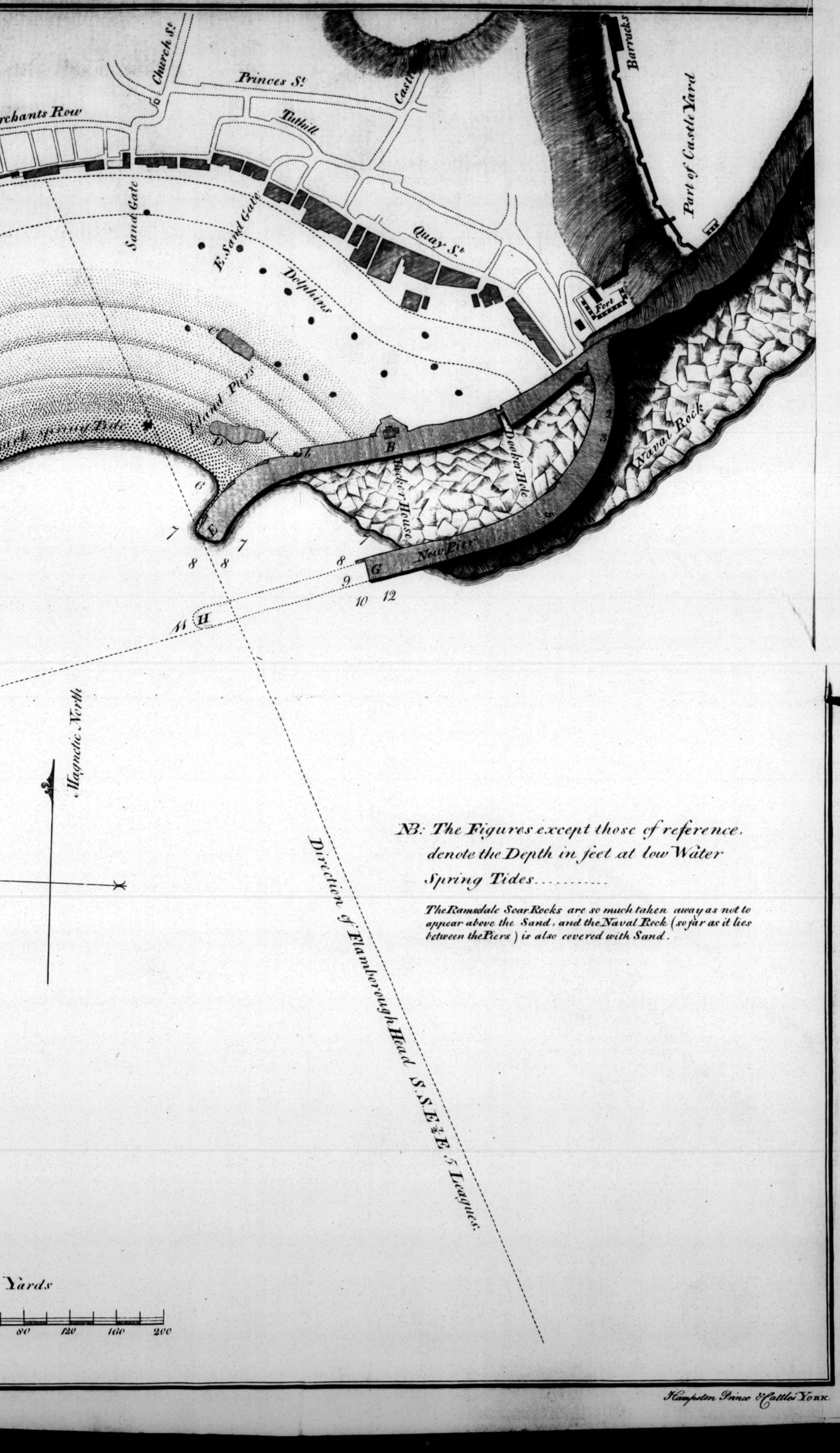
Scarborough: Printed by G. Broadrick.

BRITISH MUSEUM
15 MAR 69

A Plan of Scarborough Harbour

Sept. 1800





NB: The Figures except those of reference.
denote the Depth in feet at low Water
Spring Tides ....

The Ramsdale Scar Rocks are so much taken away as not to appear above the Sand, and the Naval Rock (so far as it lies between the Piers) is also covered with Sand.

Hampston Prince & Cattles York.